

## CLAIMS

1. A radio communication system comprising:
  - a mobile station apparatus;
  - 5 a base station apparatus that performs data transmission to and reception from said mobile station apparatus by means of radio communication; and
  - a base station control apparatus that controls said base station apparatus; wherein
- 10 said mobile station apparatus has:
  - a reception quality value detection section that detects a reception quality value of a transmit signal transmitted from said base station apparatus; and
  - a reception quality value reporting section that
- 15 reports said reception quality value to said base station apparatus;
- said base station apparatus has:
  - a section that performs data transmission for said mobile station apparatus by means of HSDPA;
  - 20 a section that performs data transmission by means of DPCH;
  - a quality deficiency signal generation section that generates a quality deficiency signal when said reception quality value is shown to be smaller than a predetermined
- 25 threshold value; and
- a quality deficiency signal reporting section that reports said quality deficiency signal to said base station control apparatus;

said base station control apparatus has a control signal transmitting section that transmits a control signal to said base station apparatus so that data transmission for said mobile station apparatus is 5 switched from HSDPA to DPCH based on said quality deficiency signal; and

    said base station apparatus has a section that switches data transmission for said mobile station apparatus from HSDPA to DPCH based on said control signal.

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2. A radio communication system comprising:
  - a mobile station apparatus;
  - a base station apparatus that performs data transmission to and reception from said mobile station apparatus by means of radio communication; and
  - 15 a base station control apparatus that controls said base station apparatus; wherein
  - said mobile station apparatus has:
    - a reception quality value detection section that
    - 20 detects a reception quality value of a transmit signal transmitted from said base station apparatus;
    - a reception quality comparison section that compares said reception quality value with a predetermined threshold value and generates a reception
    - 25 quality comparison result; and
    - a reception quality comparison result reporting section that reports said reception quality comparison result to said base station apparatus;

said base station apparatus has:

        a section that performs data transmission for said mobile station apparatus by means of HSDPA;

5        a section that performs data transmission for said mobile station apparatus by means of DPCH;

        a quality deficiency detection section that detects that said reception quality value is shown to be smaller than said predetermined threshold value by said reception quality comparison result and generates a quality

10    deficiency signal; and

        a quality deficiency signal reporting section that reports said quality deficiency signal to said base station control apparatus;

        said base station control apparatus has a control signal transmitting section that transmits a control signal to said base station apparatus so that data transmission for said mobile station apparatus is switched from HSDPA to DPCH based on said quality deficiency signal; and

20        said base station apparatus has a section that switches data transmission for said mobile station apparatus from HSDPA to DPCH based on said control signal.

3.    A radio communication system comprising:

25        a mobile station apparatus;

        a base station apparatus that performs data transmission to and reception from said mobile station apparatus by means of radio communication; and

a base station control apparatus that controls said base station apparatus; wherein  
    said mobile station apparatus has:  
        a reception quality value detection section that  
5     detects a reception quality value of a transmit signal transmitted from said base station apparatus;  
        a reception quality comparison section that compares said reception quality value with a predetermined threshold value and generates a reception  
10    quality comparison result; and  
        a reception quality comparison result reporting section that reports said reception quality comparison result to said base station apparatus;  
        said base station apparatus has:  
15     a quality deficiency signal generation section that generates a quality deficiency signal when said reception quality value is shown to be smaller than said predetermined threshold value by said reception quality comparison result;  
20     a quality deficiency signal reporting section that reports said quality deficiency signal to said base station control apparatus; and  
        a section that adds and transmits secondary CPICH with a shorter range than primary CPICH;  
25     said base station control apparatus has a control signal transmitting section that transmits a control signal to said base station apparatus so that said secondary CPICH is added and transmitted based on said

quality deficiency signal; and

    said base station apparatus has a section that adds and transmits said secondary CPICH based on said control signal.

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4. A radio communication system comprising:

    a mobile station apparatus;

    a base station apparatus that performs data transmission to and reception from said mobile station apparatus by means of radio communication; and

10     a base station control apparatus that controls said base station apparatus; wherein

    said mobile station apparatus has:

15     a reception quality value detection section that detects a reception quality value of a transmit signal transmitted from said base station apparatus;

    a quality deficiency signal generation section that compares said reception quality value with a predetermined threshold value and generates a quality

20     deficiency signal when said reception quality value is smaller than said predetermined threshold value; and

    a quality deficiency determination signal reporting section that measures a number of quality deficiency signal generation times, which is a number of times that

25     said quality deficiency signal is generated per unit time, and when said number of quality deficiency signal generation times is greater than or equal to a predetermined number of times, generates a quality

deficiency determination signal and reports that quality deficiency determination signal to said base station apparatus;

    said base station apparatus has:

5       a section that performs data transmission for said mobile station apparatus by means of HSDPA;

    a section that performs data transmission for said mobile station apparatus by means of a DPCH;

10     a quality deficiency determination detection section that detects that said quality deficiency determination signal has been received and generates a quality deficiency signal; and

15     a quality deficiency signal reporting section that reports said quality deficiency signal to said base station control apparatus;

    said base station control apparatus has a control signal transmitting section that transmits a control signal to said base station apparatus so that data transmission for said mobile station apparatus is 20 switched from HSDPA to DPCH based on said quality deficiency signal; and

    said base station apparatus has a section that switches data transmission for said mobile station apparatus from HSDPA to DPCH based on said control signal.

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5.     A radio communication system comprising:

    a mobile station apparatus;

    a base station apparatus that performs data

transmission to and reception from said mobile station apparatus by means of radio communication; and

a base station control apparatus that controls said base station apparatus; wherein

5       said mobile station apparatus has:

a reception quality value detection section that detects a reception quality value of a transmit signal transmitted from said base station apparatus; and

10      reports said reception quality value to said base station apparatus;

          said base station apparatus has:

a section that performs data transmission for said mobile station apparatus by means of HSDPA;

15      a section that performs data transmission by means of DPCH;

          a quality deficiency signal generation section that compares said reception quality value with a predetermined threshold value and generates a quality deficiency signal when said reception quality value is smaller than said predetermined threshold value; and

20      a quality deficiency signal reporting section that reports said quality deficiency signal to said base station control apparatus;

25      said base station control apparatus has a control signal transmitting section that measures a number of quality deficiency signal generation times, which is a number of times that said quality deficiency signal is

generated per unit time, and when said number of quality deficiency signal generation times is greater than or equal to a predetermined number of times, transmits a control signal to said base station apparatus so that  
5 data transmission for said mobile station apparatus is switched from HSDPA to DPCH; and

    said base station apparatus has a section that switches data transmission for said mobile station apparatus from HSDPA to DPCH based on said control signal.

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6. A radio communication system comprising:
  - a mobile station apparatus;
  - a base station apparatus that performs data transmission to and reception from said mobile station apparatus by means of radio communication; and
  - 15 a base station control apparatus that controls said base station apparatus; wherein  
        said mobile station apparatus has:
    - a reception quality value detection section that
  - 20 detects a reception quality value of a transmit signal transmitted from said base station apparatus; and  
        a reception quality value reporting section that reports said reception quality value to said base station apparatus;
  - 25       said base station apparatus has:
    - a section that performs data transmission for said mobile station apparatus by means of HSDPA;
    - a section that performs data transmission by means

of DPCH;

5 a quality deficiency signal generation section that compares said reception quality value with a predetermined threshold value and generates a quality deficiency signal when said reception quality value is smaller than said predetermined threshold value; and  
10 a quality deficiency determination signal reporting section that measures a number of quality deficiency signal generation times, which is a number of times that said quality deficiency signal is generated per unit time, and when said number of quality deficiency signal generation times is greater than or equal to a predetermined number of times, generates a quality deficiency determination signal and reports that quality deficiency determination signal to said base station control apparatus;

20 said base station control apparatus has a control signal transmitting section that transmits a control signal to said base station apparatus so that data transmission for said mobile station apparatus is switched from HSDPA to DPCH based on said quality deficiency determination signal; and

25 said base station apparatus has a section that switches data transmission for said mobile station apparatus from HSDPA to DPCH based on said control signal.

7. A base station apparatus in a radio communication system that has a mobile station apparatus, a base station

apparatus that performs data transmission to and reception from said mobile station apparatus by means of radio communication, and a base station control apparatus that controls said base station apparatus;

5 wherein said mobile station apparatus has a reception quality value detection section that detects a reception quality value of a transmit signal transmitted from said base station apparatus, and a reception quality value reporting section that reports said reception quality

10 value to said base station apparatus; and said base station control apparatus has a control signal transmitting section that transmits a control signal to said base station apparatus so that data transmission for said mobile station apparatus is switched from HSDPA to DPCH

15 based on a quality deficiency signal;

                  said base station apparatus comprising:

                  a section that performs data transmission for said mobile station apparatus by means of HSDPA;

                  a section that performs data transmission by means

20 of DPCH;

                  a quality deficiency signal generation section that generates said quality deficiency signal when said reception quality value is shown to be smaller than a predetermined threshold value;

25            a quality deficiency signal reporting section that reports said quality deficiency signal to said base station control apparatus; and

                  a section that switches data transmission for said

mobile station apparatus from HSDPA to DPCH based on said control signal from said base station control apparatus.

8. A base station control apparatus in a radio communication system that has a mobile station apparatus, a base station apparatus that performs data transmission to and reception from said mobile station apparatus by means of radio communication, and a base station control apparatus that controls said base station apparatus;

5 wherein said mobile station apparatus has a reception quality value detection section that detects a reception quality value of a transmit signal transmitted from said base station apparatus, and a reception quality value reporting section that reports said reception quality value to said base station apparatus; and said base station apparatus has a section that performs data transmission for said mobile station apparatus by means of HSDPA, a section that performs data transmission by means of DPCH, a quality deficiency signal generation section that generates a quality deficiency signal when said reception quality value is shown to be smaller than a predetermined threshold value, a quality deficiency signal reporting section that reports said quality deficiency signal to said base station control apparatus, and a section that

10 switches data transmission for said mobile station apparatus from HSDPA to DPCH based on a control signal from said base station control apparatus;

15 said base station control apparatus comprising a

control signal transmitting section that transmits said control signal to said base station apparatus so that data transmission for said mobile station apparatus is switched from HSDPA to DPCH based on said quality deficiency signal.

9. A base station apparatus in a radio communication system that has a mobile station apparatus, a base station apparatus that performs data transmission to and reception from said mobile station apparatus by means of radio communication, and a base station control apparatus that controls said base station apparatus; wherein said mobile station apparatus has a reception quality value detection section that detects a reception quality value of a transmit signal transmitted from said base station apparatus, a reception quality comparison section that compares said reception quality value with a predetermined threshold value and generates a reception quality comparison result, and a reception quality comparison result reporting section that reports said reception quality comparison result to said base station apparatus; and said base station control apparatus has a control signal transmitting section that transmits a control signal to said base station apparatus so that data transmission for said mobile station apparatus is switched from HSDPA to DPCH based on a quality deficiency signal from said base station apparatus;

said base station apparatus comprising:

a section that performs data transmission for said mobile station apparatus by means of HSDPA;

a section that performs data transmission for said mobile station apparatus by means of DPCH;

5 a quality deficiency detection section that detects that said reception quality value is shown to be smaller than said predetermined threshold value by said reception quality comparison result and generates said quality deficiency signal;

10 a quality deficiency signal reporting section that reports said quality deficiency signal to said base station control apparatus; and

a section that switches data transmission for said mobile station apparatus from HSDPA to DPCH based on said 15 control signal from said base station control apparatus.

10. A base station control apparatus in a radio communication system that has a mobile station apparatus, a base station apparatus that performs data transmission to and reception from said mobile station apparatus by means of radio communication, and a base station control apparatus that controls said base station apparatus; wherein said mobile station apparatus has a reception quality value detection section that detects a reception quality value of a transmit signal transmitted from said base station apparatus, a reception quality comparison section that compares said reception quality value with a predetermined threshold value and generates a reception

quality comparison result, and a reception quality comparison result reporting section that reports said reception quality comparison result to said base station apparatus; and said base station apparatus has a section

5 that performs data transmission for said mobile station apparatus by means of HSDPA, a section that performs data transmission for said mobile station apparatus by means of DPCH, a quality deficiency detection section that detects that said reception quality value is shown to

10 be smaller than said predetermined threshold value by said reception quality comparison result and generates a quality deficiency signal, a quality deficiency signal reporting section that reports said quality deficiency signal to said base station control apparatus, and a

15 section that switches data transmission for said mobile station apparatus from HSDPA to DPCH based on a control signal from said base station control apparatus;

                  said base station control apparatus comprising a control signal transmitting section that transmits said

20 control signal to said base station apparatus so that data transmission for said mobile station apparatus is switched from HSDPA to DPCH based on said quality deficiency signal.

25 11. A base station apparatus in a radio communication system that has a mobile station apparatus, a base station apparatus that performs data transmission to and reception from said mobile station apparatus by means

of radio communication, and a base station control apparatus that controls said base station apparatus; wherein said mobile station apparatus has a reception quality value detection section that detects a reception quality value of a transmit signal transmitted from said base station apparatus, a reception quality comparison section that compares said reception quality value with a predetermined threshold value and generates a reception quality comparison result, and a reception quality comparison result reporting section that reports said reception quality comparison result to said base station apparatus; and said base station control apparatus has a control signal transmitting section that transmits a control signal to said base station apparatus so that secondary CPICH is added and transmitted based on a quality deficiency signal from said base station apparatus;

said base station apparatus comprising:

a quality deficiency signal generation section that generates said quality deficiency signal when said reception quality value is shown to be smaller than said predetermined threshold value by said reception quality comparison result;

a quality deficiency signal reporting section that reports said quality deficiency signal to said base station control apparatus;

a section that adds and transmits said secondary CPICH with a shorter range than primary CPICH; and

a section that adds and transmits said secondary

CPICH based on said control signal from said base station control apparatus.

12. A base station control apparatus in a radio  
5 communication system that has a mobile station apparatus, a base station apparatus that performs data transmission to and reception from said mobile station apparatus by means of radio communication, and a base station control apparatus that controls said base station apparatus;  
10 wherein said mobile station apparatus has a reception quality value detection section that detects a reception quality value of a transmit signal transmitted from said base station apparatus, a reception quality comparison section that compares said reception quality value with  
15 a predetermined threshold value and generates a reception quality comparison result, and a reception quality comparison result reporting section that reports said reception quality comparison result to said base station apparatus; and said base station apparatus has a quality  
20 deficiency signal generation section that generates a quality deficiency signal when said reception quality value is shown to be smaller than said predetermined threshold value by said reception quality comparison result, a quality deficiency signal reporting section  
25 that reports said quality deficiency signal to said base station control apparatus, a section that adds and transmits secondary CPICH with a shorter range than primary CPICH, and a section that adds and transmits said

secondary CPICH based on a control signal from said base station control apparatus;

    said base station control apparatus comprising a control signal transmitting section that transmits said 5 control signal to said base station apparatus so that said secondary CPICH is added and transmitted based on said quality deficiency signal.

13. A base station apparatus in a radio communication 10 system that has a mobile station apparatus, a base station apparatus that performs data transmission to and reception from said mobile station apparatus by means of radio communication, and a base station control apparatus that controls said base station apparatus; 15 wherein said mobile station apparatus has a reception quality value detection section that detects a reception quality value of a transmit signal transmitted from said base station apparatus, a quality deficiency signal generation section that compares said reception quality 20 value with a predetermined threshold value and generates a quality deficiency signal when said reception quality value is smaller than said predetermined threshold value, and a quality deficiency determination signal reporting section that measures a number of quality deficiency 25 signal generation times, which is a number of times that said quality deficiency signal is generated per unit time, and when said number of quality deficiency signal generation times is greater than or equal to a

predetermined number of times, generates a quality deficiency determination signal and reports that quality deficiency determination signal to said base station apparatus; and said base station control apparatus has

5 a control signal transmitting section that transmits a control signal to said base station apparatus so that data transmission for said mobile station apparatus is switched from HSDPA to DPCH based on a quality deficiency signal from said base station apparatus;

10 said base station apparatus comprising:

    a section that performs data transmission for said mobile station apparatus by means of HSDPA;

    a section that performs data transmission for said mobile station apparatus by means of DPCH;

15 a quality deficiency determination detection section that detects that said quality deficiency determination signal has been received and generates a quality deficiency signal;

    a quality deficiency signal reporting section that

20 reports said quality deficiency signal to said base station control apparatus; and

    a section that switches data transmission for said mobile station apparatus from HSDPA to DPCH based on said control signal from said base station control apparatus.

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14. A base station control apparatus in a radio communication system that has a mobile station apparatus, a base station apparatus that performs data transmission

to and reception from said mobile station apparatus by means of radio communication, and a base station control apparatus that controls said base station apparatus; wherein said mobile station apparatus has a reception quality value detection section that detects a reception quality value of a transmit signal transmitted from said base station apparatus, a quality deficiency signal generation section that compares said reception quality value with a predetermined threshold value and generates a quality deficiency signal when said reception quality value is smaller than said predetermined threshold value, and a quality deficiency determination signal reporting section that measures a number of quality deficiency signal generation times, which is a number of times that said quality deficiency signal is generated per unit time, and when said number of quality deficiency signal generation times is greater than or equal to a predetermined number of times, generates a quality deficiency determination signal and reports that quality deficiency determination signal to said base station apparatus; and said base station apparatus has a section that performs data transmission for said mobile station apparatus by means of HSDPA, a section that performs data transmission for said mobile station apparatus by means of DPCH, a quality deficiency determination detection section that detects that said quality deficiency determination signal has been received and generates a quality deficiency signal, a quality deficiency signal

reporting section that reports said quality deficiency signal to said base station control apparatus, and a section that switches data transmission for said mobile station apparatus from HSDPA to DPCH based on a control 5 signal from said base station control apparatus;

    said base station control apparatus comprising a control signal transmitting section that transmits a control signal to said base station apparatus so that data transmission for said mobile station apparatus is 10 switched from HSDPA to DPCH based on said quality deficiency signal from said base station apparatus.

15. A base station apparatus in a radio communication system that has a mobile station apparatus, a base station apparatus that performs data transmission to and 15 reception from said mobile station apparatus by means of radio communication, and a base station control apparatus that controls said base station apparatus; wherein said mobile station apparatus has a reception 20 quality value detection section that detects a reception quality value of a transmit signal transmitted from said base station apparatus, and a reception quality value reporting section that reports said reception quality value to said base station apparatus; and said base station 25 control apparatus has a control signal transmitting section that measures a number of quality deficiency signal generation times, which is a number of times that said quality deficiency signal is generated per unit time,

and when said number of quality deficiency signal generation times is greater than or equal to a predetermined number of times, transmits a control signal to said base station apparatus so that data transmission for said mobile station apparatus is switched from HSDPA to DPCH;

said base station apparatus comprising:

a section that performs data transmission for said mobile station apparatus by means of HSDPA;

10 a section that performs data transmission by means of DPCH;

a quality deficiency signal generation section that compares said reception quality value with a predetermined threshold value and generates a quality deficiency signal when said reception quality value is smaller than said predetermined threshold value;

a quality deficiency signal reporting section that reports said quality deficiency signal to said base station control apparatus; and

20 a section that switches data transmission for said mobile station apparatus from HSDPA to DPCH based on said control signal from said base station control apparatus.

16. A base station control apparatus in a radio communication system that has a mobile station apparatus, a base station apparatus that performs data transmission to and reception from said mobile station apparatus by means of radio communication, and a base station control

apparatus that controls said base station apparatus; wherein said mobile station apparatus has a reception quality value detection section that detects a reception quality value of a transmit signal transmitted from said 5 base station apparatus, and a reception quality value reporting section that reports said reception quality value to said base station apparatus; said base station apparatus has a section that performs data transmission for said mobile station apparatus by means of HSDPA, a 10 section that performs data transmission by means of DPCH, a quality deficiency signal generation section that compares said reception quality value with a predetermined threshold value and generates a quality deficiency signal when said reception quality value is 15 smaller than said predetermined threshold value, and a quality deficiency determination signal reporting section that reports said quality deficiency signal to said base station control apparatus; and said base station apparatus has a section that switches data transmission 20 for said mobile station apparatus from HSDPA to DPCH based on a control signal from said base station control apparatus;

      said base station control apparatus comprising a control signal transmitting section that measures a 25 number of quality deficiency signal generation times, which is a number of times that said quality deficiency signal is generated per unit time, and when said number of quality deficiency signal generation times is greater

than or equal to a predetermined number of times, transmits said control signal to said base station apparatus so that data transmission for said mobile station apparatus is switched from HSDPA to DPCH.

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17. A base station apparatus in a radio communication system that has a mobile station apparatus, a base station apparatus that performs data transmission to and reception from said mobile station apparatus by means 10 of radio communication, and a base station control apparatus that controls said base station apparatus; wherein said mobile station apparatus has a reception quality value detection section that detects a reception quality value of a transmit signal transmitted from said 15 base station apparatus, and a reception quality value reporting section that reports said reception quality value to said base station apparatus; and said base station control apparatus has a control signal transmitting section that transmits a control signal to said base 20 station apparatus so that data transmission for said mobile station apparatus is switched from HSDPA to DPCH based on a quality deficiency determination signal from said base station apparatus;

    said base station apparatus comprising:

25       a section that performs data transmission for said mobile station apparatus by means of HSDPA;  
       a section that performs data transmission by means of DPCH;

a quality deficiency signal generation section that compares said reception quality value with a predetermined threshold value and generates a quality deficiency signal when said reception quality value is 5 smaller than said predetermined threshold value;

a quality deficiency determination signal reporting section that measures a number of quality deficiency signal generation times, which is a number of times that said quality deficiency signal is generated per unit time, 10 and when said number of quality deficiency signal generation times is greater than or equal to a predetermined number of times, generates a quality deficiency determination signal and reports that quality deficiency determination signal to said base station 15 control apparatus; and

a section that switches data transmission for said mobile station apparatus from HSDPA to DPCH based on said control signal from said base station control apparatus.

20 18. A base station control apparatus in a radio communication system that has a mobile station apparatus, a base station apparatus that performs data transmission to and reception from said mobile station apparatus by means of radio communication, and a base station control 25 apparatus that controls said base station apparatus; wherein said mobile station apparatus has a reception quality value detection section that detects a reception quality value of a transmit signal transmitted from said

base station apparatus, and a reception quality value reporting section that reports said reception quality value to said base station apparatus; and said base station apparatus has a section that performs data transmission 5 for said mobile station apparatus by means of HSDPA, a section that performs data transmission by means of DPCH, a quality deficiency signal generation section that compares said reception quality value with a predetermined threshold value and generates a quality 10 deficiency signal when said reception quality value is smaller than said predetermined threshold value, a quality deficiency determination signal reporting section that measures a number of quality deficiency signal generation times, which is a number of times that 15 said quality deficiency signal is generated per unit time, and when said number of quality deficiency signal generation times is greater than or equal to a predetermined number of times, generates a quality deficiency determination signal and reports this quality 20 deficiency determination signal to said base station control apparatus, and a section that switches data transmission for said mobile station apparatus from HSDPA to DPCH based on a control signal from said base station control apparatus;

25       said base station control apparatus comprising a control signal transmitting section that transmits said control signal to said base station apparatus so that data transmission for said mobile station apparatus is

switched from HSDPA to DPCH based on said quality deficiency determination signal.